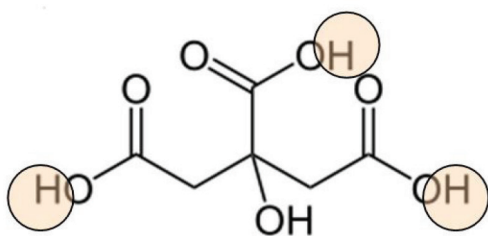


Determination of Total Acidity in Beverages

Introduction

This method is used for the quantitative determination of total acidity in fruit juice. Citric acid is the example in this titration application.



Titration applications for determining the acidity in milk and the acidity in wine are also available.

Apparatus

- TL 5000 / TL 7000 / TL 7750 / TL 7800
- Magnetic stirrer (TM 235 for TL 7000; TM 50 for TL 5000)
- 20 mL exchangeable unit (WA 20) with brown glass bottle for titrant **if using TL 7000 / TL 7750 / TL 7800**

Electrode and Electrolyte

- pH combination electrode with integrated temperature sensor, such as A 162 2M-DIN-ID (item # 285130275)
- KCl 3 mol/L electrolyte

Solutions

- **Titrant:** Sodium hydroxide solution 0.1 mol/L
- **Titer:** Potassium hydrogen phthalate (reference material)
- **Calibration solutions:** Technical buffer pH=4.00 and pH=7.00 or in DIN buffer pH=4.01 and pH=6.87
- Soda lime for carbon dioxide uptake of the reagent



Calibration

The pH combination electrode is calibrated in technical buffer pH=4.00 and pH=7.00 or in DIN buffer pH=4.01 and pH=6.87.

Example of the calibration documentation:

Calibration

Buffers used

pH buffer 1:	TEC_4.000
pH buffer 2:	TEC_7.000

Measured values

pH buffer 1:	TEC_4.000	165.6 mV / 23.4 °C
pH buffer 2:	TEC_7.000	-11.2 mV / 23.0 °C

Calibration data

Slope:	99.4 % / -58.8 mV/pH
Zero point:	pH 6.81 / -11.2 mV
Temperature:	23.4 °C (a)
Date and time:	07.03.13 / 15:04

Determination of the exact concentration of the titrant

Carbon dioxide absorption from the air occurs in the sodium hydroxide solution of sodium bicarbonate, which changes the pH of the titrant. To prevent this, a drying tube filled with soda lime is placed on the reagent bottle. The exact concentration of the sodium hydroxide solution is determined using the standard potassium hydrogen phthalate. The potassium hydrogen phthalate is dried in the oven before the titer determination for 2 hours at 120 °C and cooled in a desiccator.

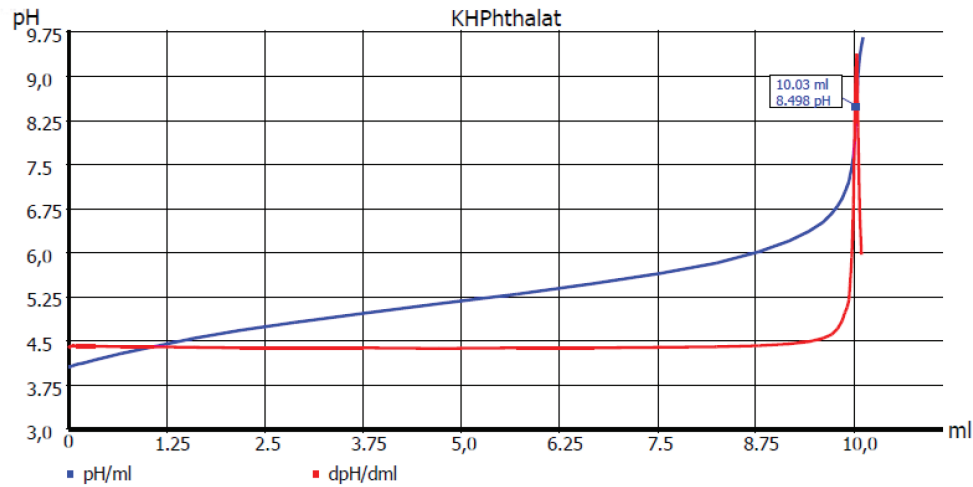
Implementation

In a 50 mL beaker, 0.1 to 0.3 g potassium hydrogen phthalate is weighed accurately and dissolved in 30 mL of dist. water with stirring. It is titrated with 0.1 mol/l sodium hydroxide solution.

Titrant Standardization Documentation

GLP documentation

Titration graph



Method data

Method name:	Titre NaOH	Titration duration:	2 m 15 s
End date:	08.01.13	End time:	15:46:03

Titration data

Start pH:	pH 4.065	Weight:	0.20490 g
Start temperature:	25.0 °C (m)	End pH:	pH 9.667
Zero point:	pH 6.85 / -8.9 mV	End temperature:	25.0 °C (m)
EQ:	10.032 ml / pH 8.498	Slope:	98.7 % / -58.4 mV/pH
Mean value:	---	Titre:	0.1000 mol/l
		RSD:	---

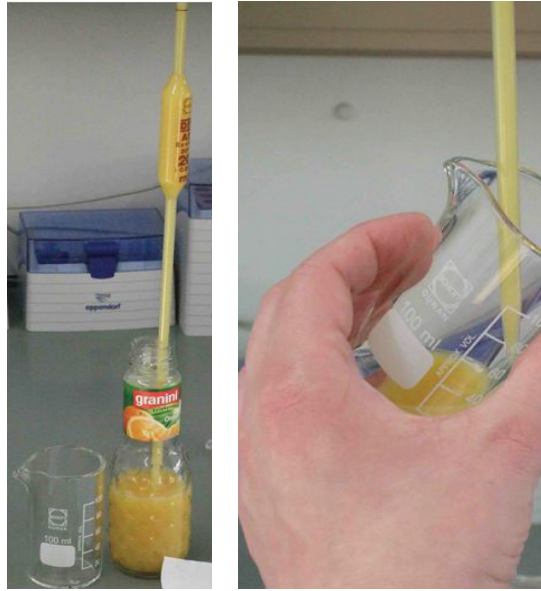
Calculation formula

Titre:	$(W \cdot F2) / ((EQ1 - B) \cdot M \cdot F1) \rightarrow WA$	Mol (M):	204.22000
Weight (W):	0.2049 g (m)	Factor 2 (F2):	1000.0000
Blank value (B):	0.0000 ml	Factor 1 (F1):	1.0000
Statistics:	3		

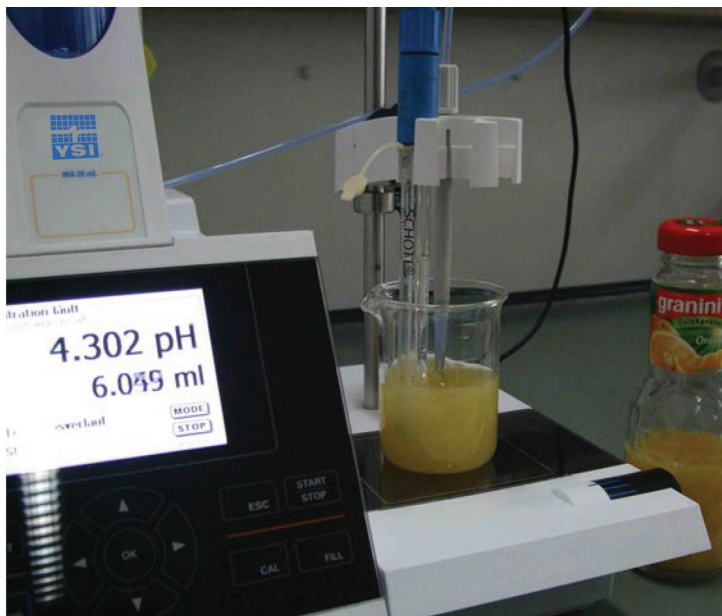
Titration of the sample

Load the default method "Total Acidity". The method is ready to use.

Into a 50 mL beaker, 10 mL fruit juice is pipetted accurately and mixed with 20 mL of dist. water with stirring. Immerse the electrode and burette tip into the sample. This is titrated with 0.1 mol/L sodium hydroxide solution.



Preparation of the sample



Titration of the sample

Reaction equation:

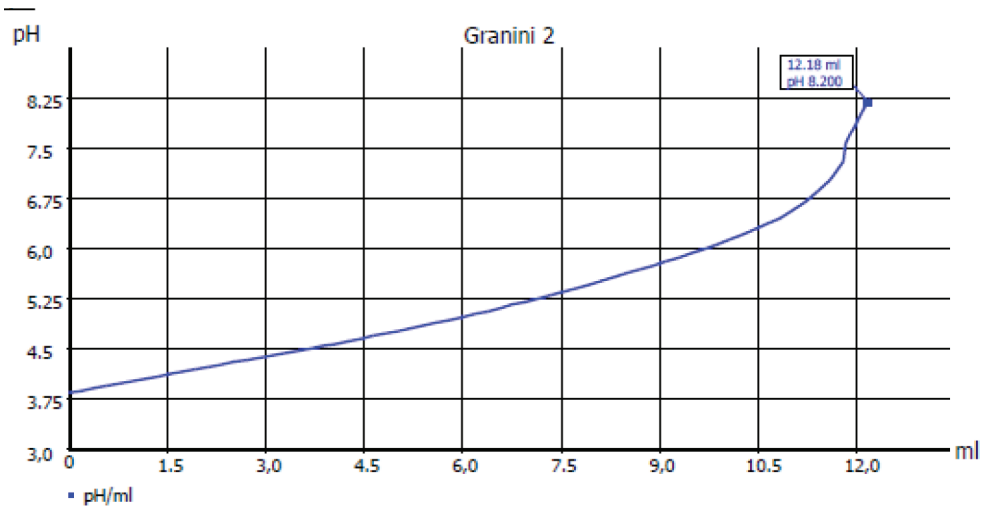
Citric acid is a tribasic acid. There are three moles of sodium hydroxide required to neutralize one mole of citric acid completely:



Result example:

GLP documentation

Titration graph



Method data

Method name:	Orange Juice	Titration duration:	1 m 57 s
End date:	08.03.13	End time:	12:19:40

Titration data

Sample ID:	Granini 2	Pattern:	10.000 ml
Start pH:	pH 3.853	End pH:	pH 8.235
Start temperature:	23.3 °C (a)	End temperature:	23.8 °C (a)
Zero point:	pH 6.81 / -11.3 mV	Slope:	99.6% / -58.9 mV/pH
EPI:	12.179 ml / pH 8.200	Acidity:	7.80 g/l

Calculation formula

Acidity:	(EP1-B)*T*M*F1/(V*F2)	Mol (M):	64.04000
Blank value (B):	0.0000 ml	Titre (T):	0.10000000 (m)
Factor 1 (F1):	1.0000	Pattern (V):	10.000 ml (m)
Factor 2 (F2):	1.0000	Statistics:	Off

Method Information (example)

Method data overall view

Method name:	Orange Juice	Created at:	03/08/13 12:06:41
Method type:	Automatic titration	Last modification:	03/08/13 12:16:39
Measured value:	pH	Damping settings:	None
Titration mode:	End pt.	Documentation:	GLP
Linear steps:	0.040 ml		

Measuring speed / drift	Normal:	minimum holding time:	02 s
		maximum holding time:	15 s
		Measuring time:	02 s
		Drift:	20 mV/min

Initial waiting time:	0s
Titration direction:	Increase
Pretitration:	Off

Endpoint 1:	pH 8.200	Delta endpoint 1:	pH 1.000
Endpoint 2:	Off	Endpoint delay 1:	5s

Dosing parameter

Dosing speed:	65.00 %	Filling speed:	30 s
Maximum dosing volume:	50.00 ml		

Unit values

Unit size:	20 ml
Unit ID:	10039117
Reagent:	NaOH
Batch ID:	no entry
Concentration [mol/l]:	0.01000
Determined at:	03/08/13 20:03:29
Expire date:	--
Opened/compounded:	--
Test according ISO 8655:	03/19/12
Last modification:	03/08/13 12:03:32



Xylem Inc.
1725 Brannum Lane
Yellow Springs, Ohio 45387

Application/Technical Support:
+ 1-845-258-1200
titration.yxi@xyleminc.com

Ordering:
+1-937-767-7241
orders@ysi.com